OCR
Oxford Cambridge and RSA

GCE

Geology

Advanced GCE **A2 H487**

Advanced Subsidiary GCE **AS H087**

OCR Report to Centres June 2017

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

CONTENTS

Advanced GCE Geology (H487)

Advanced Subsidiary GCE Geology (H087)

OCR REPORT TO CENTRES

F791 Global Tectonics

General Comments:

This was the ninth year of assessment of AS Geology in the current format and the final year for first entry AS candidates studying the one year course. Many candidates found this paper a little more challenging than last summer. On every question at least some candidates scored full marks. There was no evidence that candidates ran out of time, and the majority were able to attempt the extended response question.

Candidates were confident with earthquakes and most coped well with the calculations. The distribution of plates and the tectonic processes were generally well understood along with the differences between oceanic and continental plates. Most candidates knew something about hot spots and mantle plumes although most did not know enough of the details to gain full marks in the extended response question.

Candidates continue to find it difficult to provide sufficient detail in their answers to demonstrate an appropriate level of knowledge and understanding. In past series the topics that candidates found most challenging were palaeomagnetism, planetary geology and structural geology and this remained the case this year.

Comments on Individual Questions:

Question 1:

Q1 Although this question covered two topics which have challenged the depth of knowledge of candidates in the past it was encouraging to see that the level of detail provided by many candidates, particularly for palaeomagnetism, was more appropriate.

a) (i) Many candidates gained one mark for the magnetic inclinations marked on the Earth cross section, with just the northern two arrows correct. Often all the southern hemisphere arrows were incorrect, as they were pointing into the Earth. Line orientation was generally good; however, the arrows were often on the wrong "end". However, a significant number of candidates had them all correct and a smaller number all correct apart from a double ended horizontal arrow at the equator. It was clear that those who gained one mark were using the arrow that was given as a clue but could not visualise the flow direction of the magnetic field.

(ii) Not many candidates had a precise and accurate description of magnetic inclination. The best answers mentioned the angle that the magnetic field makes with the horizontal or linked it specifically to being horizontal at the equator and vertical at the poles. Some candidates referred to magnetic reversals and even polar wandering which was not relevant.

b) (i) This question was answered well indicating that many candidates understood the logic of the self-exciting dynamo within the Earth. Most candidates gained at least 3 out of 4 of the marks.

(ii) There is a clear improvement in the detail of the knowledge candidates have about the formation of palaeomagnetism in rocks. In particular, many more candidates link palaeomagnetism to specifically iron rich minerals and to a drop below the Curie point in order to become permanent remnant magnetism.

c) Very few candidates were aware of the types of exploration that have taken place on Venus with the best answers mentioning radar, mapping or the use of infrared images. Many did though list the evidence such as volcanic gases or volcanoes. Hubble telescope was a common error as well as talking about the Jovian moon, Io.

Question 2:

Q2 Candidates performed well in this question

a) Very few candidates gained zero marks with most at least gaining marks for the correct method. Some of the working was a little careless; i.e. leaving out the "35 for Chuetsu" or the inaccurate rounding to 14.8%.

b) (i) Most candidates were familiar with the massive destruction of buildings or infrastructure leading to huge financial costs.

b) (ii) The most common answers were regarding radon / gas levels (generally known very well), followed by ground and water levels. Seismic Gap theory often missed a mark or two with precision lacking in the definition. Animal behaviour was answered by some but again detail tended to be lacking. Candidates should learn the name of the technique, what the technique measures, the instrumentation required and how it changes before an earthquake.

c) (i) L wave features are very well known with few errors. Being surface waves and the slowest waves were the most commonly cited features.

(ii) The most commonly quoted reason given for L waves being the most destructive wave was that they are surface waves leading to more ground movement.

d) An understanding of the elastic rebound theory of earthquake formation tended to be either poorly known (0 or 1 mark) or very well known. "Stress builds is applied" & “rock fractures" marks were the most commonly gained. There is still some confusion between stress and strain/strain energy as well as pressure being used as an alternative to stress.

Question 3:

Q3 This question contained both content that will be updated in the reformed qualification and a question style similar in approach to a multiple choice question (MCQ). Note should be taken where candidates were credited with a response in this instance which would not be credited in the future.

a) (i) The majority of candidates knew the Eurasian and North American plates with a smaller number knowing Nazca and fewer still Scotia. Spelling was generally accurate with Nasca being the most common error. Candidates should take care when writing these answers because sometimes it is hard to be sure of the spelling if the writing is unclear and so marks could be lost.

(ii) The shallow focus earthquake zones were best known with most shading an area of MOR. Overshading the Andes into the Pacific was a common error so that shallow focus areas were shaded as well as the correct intermediate and deep focus areas, in the Andes the intermediate and deep focus earthquakes are primarily on land and

not offshore.

b) (i) There has been a noticeable improvement in candidate's knowledge of both ridge push and slab pull. While many candidates were credited, in this instance, with the explanation that the pressure exerted by magma forcing its way to the surface at MOR's was responsible for pushing the plates apart it should be noted that in future years candidates will be expected to demonstrate current understanding rather than historical propositions. "Mid-ocean ridges are sites where oceanic lithosphere is created. They are hotter and therefore stand higher than older, cooler lithosphere. As a result, the base of the lithosphere slopes away from the ridges. Under the influence of gravity, the lithosphere tries to move down this slope, creating a ridge-push force on the plate it is part of. The force is much smaller - perhaps only a tenth - of the force due to slab pull." www.geolsoc.org.uk/Plate-Tectonics .

(ii) A noticeable improvement with candidates not only linking slab pull to subduction but many discussed the role of gravity and the density of the subducting plate pulling the rest of the plate behind.

(iii) The best answers included very good descriptions of the rheid asthenosphere and rigid lithosphere linked to mantle convection and discussed the balance between sea floor spreading and subduction. Many candidates quoted convection currents, but a few failed to refer to the convection being in the mantle and so lost the mark.

c) There was a generally good understanding of the differences between oceanic and continental lithosphere. However the style of question proved more challenging than a simple table that needed to be completed with facts and while there was a spread of across the full range most candidates only gained 1 or 2 marks.

Question 4

Q4 Structural geology and practical questions continue to be a challenging area for many candidates,

a) (i) Very few candidates achieved both marks. The unconformity was located successfully by the majority of candidates. A majority of candidates marked on the axial plane trace to the West of the fault but did not continue it to the East. Candidates should be encouraged to make sure that the axial plane trace is seen on both sides of a fault.

(ii) Measuring the direction of strike proved difficult for many candidates leading to a wide range of angles given covering the whole 360°. Candidates should be encouraged to be able to plot dips and strikes on a simple map as well as reading the values off a map. It is generally good practice to give strike directions as 3 figure numbers.

(iii) Bedding planes was correctly given by the majority of candidates with some just giving "beds", which was incorrect.

b) (i) Many candidates were confused by the subheadings of "youngest" and "oldest" and so gave the history in the reverse order. Others just described the lithologies in order rather than the structures. Many candidates did gain at least one mark often getting the relative age of the faults correct.

(ii) Many candidates clearly knew the idea of cross cutting relationships, but just discussed the "older" and "younger" faults rather than giving the letter of the faults on the map. The unconformity was sometimes referred to as an "unconformity intrusion" which shows that some candidates are unsure of the origin of an unconformity. Fault Q was described better with candidates indicating that it cross cuts the unconformity and so is younger. Quite a few candidates referred to Fault P not cutting the unconformity which is not evidence of an age relationship, instead candidates needed to explicitly say that the conglomerate overlies or cross cuts fault P.

c) (i) Many candidates were able to correctly measure the fault dip. 105° was a common error (measuring the obtuse angle on the other side of the 75°).

(ii) Many candidates recognised the structure as being “fault breccia”. A number of candidates left out the word "Fault".

(iii) The general idea of fragments breaking off was pretty well understood. Explicit reference to movement along the fault plane was less well explained. Common errors were "fault applies pressure / friction" with others discussing breccia formation from a sedimentary perspective.

(iv) Many candidates knew the term and about half of these candidates added an "L" to get "Slickenslides". Sometimes the "c" was omitted. The idea of movement / scraping along the fault plane was better known and explained than in the fault breccia question. A common error was referring to glacial striations.

Question 5

There was a wide range of answers regarding hotspots and mantle plumes with relatively few candidates gaining greater than 6 marks. The most frequently gained marks were the "island chain explanation" with volcanoes produced and reference to volcanic islands, seamounts, guyots, erosion and extinct volcanoes.

Most candidates linked the island chain formation to the stationary mantle plume and the moving lithospheric plate. The definitions of hot spots and mantle plumes were variable with better answers discussing the location within plates and hotspots being the surface expression of a mantle plume.

A common error was to talk correctly of the origin of the mantle plume being at the core/mantle boundary but then describing it as an area of rising magma rather than high geothermal heat flux/hot rock. Weaker answers did not appreciate that the mantle plume causes the hotspot.

Only the best answers referred to the evidence for mantle plumes and hotspots being seismic tomography, basaltic magma, positive heat flow and gravity anomalies. Better answers also provided a detailed annotated diagram illustrating the processes involved.

F792 Rocks – Processes and Products

General Comments:

This was the ninth year of assessment of AS Geology in the current format and the final year for first entry AS candidates studying the one year course. This paper was a similar standard to that of last summer. On every question at least some candidates scored full marks. There was no evidence that candidates ran out of time, and the majority were able to attempt the extended prose question.

This paper covered wide areas of the F792 specification and had a number of very accessible questions using tick lists, tables and diagrams for which Candidates often gained high marks. Although there were a number of 'no responses' to some part questions, there was no evidence that time was an issue. Most Candidates attempted both of the two 10 mark extended response questions at the end of the paper. A significant number however did not use geological terminology required from the specification in their answers.

Candidates should also be encouraged to ensure they are confident in their use of geological terminology. Candidates, who were able to show a sound understanding of geological terminology, then gained credit. Common misconceptions were apparent, with candidates continuing to be confused between mineral and rock names. Additionally, some candidates were confused over the differences between igneous, sedimentary and metamorphic terminology.

Candidates should be encouraged to highlight the command words to ensure they focus on the requirements of the question; some candidate responses appeared to be to answering a different question on the same topic.

The quality of Candidates' diagrams varied. Candidates who exceled provided very detailed, accurate, fully labelled diagrams, thus gaining maximum marks with relative ease. Those candidates who did not take note of the command words of the question did not gain credit due to a lack of labels required. Missing scale from diagrams also posed an issue. Diagrams were also at times difficult to decipher and also did not gain any credit. Candidates should be encouraged to practice drawing labelled diagrams as this is a key skill in Geology.

A number of Candidates were not accurate with their reading numerical data from a graph. It is recommended for students to use a ruler to ensure they are able to correctly read the data from across the graph. Generally the basic equipment required for all Geology examination papers is: black pens, calculator, ruler with a mm scale, pencil, pencil sharpener, rubber, protractor and, for Global Tectonics, a pair of compasses.

If Candidates require more space to write their answer then this is provided at the end of the question paper booklet to avoid the necessity of resorting to a separate additional pages booklet. Centres should also consider the advice they give to candidates who find handwriting difficult. For example writing technical terms in capitals where this is a requirement for Quality of Written Communication (to provide clarity in the interpretation of their spelling), or applying to make use of the provision available to candidates who are for example dyslexic.

Comments on Individual Questions:

Question 1

Q1 The quality of responses to this question on the rock cycle and earth surface processes was generally good and also it proved to be a good discriminator. Candidates with a good grasp

of the basic rock groups, weathering, transport and erosional processes scored highly.

a) (i) Most Candidates could state the three different rock types.
(ii) Candidates generally labelled both uplift and burial correctly. Some candidates labelled burial below the rock group and uplift occurring above rock group C. Candidates with good understanding of external and internal processes had no problem with this question.
(iii) Generally candidates correctly labelled the positioning of both sedimentary and metamorphic rocks in the correct location. Some Candidates incorrectly positioned sedimentary at far greater temperatures and pressures than accepted.

b) (i) The Hjulström curve was known by the majority of Candidates, with students able to state the minimum velocity. Some students did not read the graph accurately and therefore could not be credited. Units are required and some students did not provide this.
(ii) Most Candidates understood how to state the minimum velocity to erode a sediment, if their answer to b) (i) was correct. Again, some candidates did not read the graph accurately.
(iii) The most common correct answer for one mark was the in-situ breakdown of rock. Some candidates confused erosion with weathering. A significant number of candidates did not provide terminology to explain transportation when defining erosion.
(iv) Diagrams representing the processes of saltation and traction were of varied quality. The key commands for this question are 'fully labelled diagram.' A number of candidates drew an excellent diagram of both, but did not provide any labels, limiting their answer to 1 mark. The best candidates drew clear, accurate diagrams and provided detailed annotations to explain the process.
(v) Candidates generally provided an accurate explanation suspension. Candidates however became confused when describing solution, discussing sediments rather than solutes or soluble minerals. This limited students due to poor knowledge of these differences.

c) (i) Those who knew the term diagenesis had no problem with this question. It was clear that some students only had partial knowledge of this topic and did not use both compaction and cementation in their answer.
(ii) Many Candidates could describe the process of cementation but did not explain it. Some Candidates also simply copied the information from the diagram, rather than using it to aid their explanation. Candidates could also improve their answers by using more precise terminology.
(iii) The majority of Candidates knew how to complete the rose diagram. Students should practice labelling axis and ensuring they are accurate when plotting. Some candidates shaded the opposite sector of the diagram, highlighting some Candidates had not read the question carefully.
(iv) The majority of Candidates stated the correct palaeocurrent direction. Some Candidates did not use compass directions or bearings and therefore were not credited.

Question 2

Q2 Although there were good answers to this question on the extent of the continental shelf, many were weak and graphic log interpretation continues to be a poorly executed area of the specification.

a) (i) The majority of Candidates answered correctly the rock type formed at **E**. The most common correct response was mudstone.

(ii) Candidates did not focus on the command words of this question. Candidates were required to state and explain. This led to many partially correct answers where candidates stated the energy level, but did not go on to explain it. This resulted in this question being answered poorly.

(iii) Many Candidates were able to gain some credit for explaining how the alternating sequence of rock at **F** had formed. Candidates identified that the coarser sediment was deposited in higher energy conditions, whereas the finer sediment was deposited in deeper water. Fewer appreciated that deposition could have alternated due to changing energy conditions.

b) (i) Few candidates achieved full marks on this question. Many candidates did not describe the correct environment of **F**, instead discussing desert or Aeolian environments. This limited the answer to 2 marks. The most accurate diagrams showed current direction as well as concave upwards. The most common correct explanation discussed the grains advancing up the stoss side by saltation. Few students discussed the movement by the marine current and formation of sand bars.

c) (i) The majority of Candidates drew an accurate diagram of a coarse grained rock. Some Candidates forgot to provide a suitable scale or did not provide a scale at all.

(ii) Conglomerate as the named coarse grain rock was well known.

d) (i) Most Candidates were able to gain some credit for describing the origin of the deposited material as land based, with fewer explaining the origin. Many candidates stated a transport method for a maximum of 1 mark. Candidates should ensure they read questions carefully so they know what to do before starting their answers.

(ii) There were many excellent, accurate and fully labelled diagrams showing the difference between symmetrical and asymmetrical ripple marks. Candidates are again reminded to clearly read the question to ascertain the command words of the question. Many Candidates did not label their diagrams and therefore restricted their answer to just 1 mark. Diagrams which were poorly drawn often showed overhanging on the slope, which was not credited. Candidates are reminded that overhangs should not be drawn.

(iii) The question was poorly answered. Candidates found it difficult to explain why both symmetrical and asymmetrical ripple marks are found in shallow seas. Terminology was poorly used and although many Candidates could explain the bidirectional movement due to tides, they found it difficult to explain the asymmetrical ripple marks.

Question 3

Q3 There were many good answers to this question on igneous rocks and intrusive and extrusive features. The explanation to the magma found at hotspots was understood less well.

a) (i) There were many good answers to this question on the distribution of lava flows and the relationship to the shape of the island. The best answers described fully the pattern and the reasoning for the pattern. Many Candidates discussed lavas flowing down valleys or flowing into the sea, but did not discuss the relationship to the shape of the island, as stated in the question.

(ii) The majority of Candidates knew that the lava was pahoehoe. Some Candidates used the term ropey, which was also accepted. A small proportion of Candidates stated a list of possible lava types which was not accepted. Candidates are reminded the lists cannot be credited for one specific name.

(iii) This question was answered well with the majority of students gaining over half marks. A variety of diagrams were produced in response to this question. Candidates drew a thin section diagram to show the vesicular texture. Diagrams required a label. The

vesicles were carefully drawn in the majority of cases and labelled. Candidates were also required to have a correct scale to gain credit for the diagram.
Once again, some Candidates continued to incorrectly discuss the gases escaping to produce the vesicles. Some Candidates could improve their answer by ensuring they label diagrams and add a scale particularly when prompted to do so in the question.

b) (i) This question was well answered with Candidates correctly stating Mafic as the correct classification.

(ii) Candidates who had learned that rocks formed at hotspots and other volcanic regions had no problem naming rock **J** as dolerite and rock **K** as gabbro. The rock characteristics should have helped Candidates but some Candidates incorrectly named both or rock **J**.

(iii) This question was poorly answered. Some Candidates did not take note of the word magma and wrote about the formation of the hotspot. Explanations were limited due to not using the correct terminology. Candidates mainly gained marks for stating convection transported heat to the surface and mantle plumes rise from deep within the mantle. Fewer Candidates discussed partial melting in their answers.

c) (i) The explanation to this question was significantly better than the diagram. Few Candidates could correctly draw and label the pillow lavas. The majority of Candidates correctly identified the location these features are formed in and some discussed their texture for an additional mark. The best answers labelled and explained the lobe breaking when magma pressure rises, however only a small number of Candidates were able to effectively use annotated diagrams in this way..

Question 4

Q4 Responses to this question on magmas and intrusions and their relationship to metamorphism were variable and it proved to be a good discriminator. Most Candidates coped well with second section of this question in part (b) but the origin of magmas was not answered well.

a) (i) This question was answered well with the majority of Candidates correctly indicating plate movement. Fewer Candidates could shade and label the areas of partial melting, with many shading but not labelling. Candidates are reminded to clearly label their diagrams to ensure they can access the full range of marks.

(ii) Responses to this question were poor. Some Candidates did not take note of the word three and instead named one or two characteristics. There was also some confusion with Candidates stating Characteristics of non-silicic magmas.

(iii) There were some excellent answers to this question on the origin of granitic magmas that gave good descriptions of the partial melting and assimilation of crust. However, these were in the minority and many Candidates gave vague explanations, lacking the correct terminology and struggled to word their explanation. The majority clearly had limited knowledge of this section of the specification.

(iv) Candidates who were successful in this answer discussed the high heat causing recrystallisation. The majority stated the aureole forms due to contact metamorphism and variation in grade was due to distance from the aureole. Some Candidates struggled to explain how the metamorphic aureole forms or only stated a partial answer.

(v) This question was answered well by the majority of Candidates, with the Candidates knowing the parent rock of each of the three metamorphic rocks. Those who did not gain full marks were often incorrect in their parent rock name for spotted rock.

b) (i) Those who were able to correctly name the volcanic product were in the minority. Some gave the correct name of the foreground feature. The background product was

also credited.

(ii) Volcanic products were better known than the characteristics of magmas. This was evident in the number of candidates gaining full marks in this question. Common answers included ash, tuff and lava.

(iii) Candidate's descriptions to changes in ground level, groundwater and seismicity were very generic and lacked the detail in some cases. Candidates found it easier to discuss changes in ground level, but found it difficult to discuss the changes in groundwater. Additionally, candidate answers with regards to seismicity were limited and lacked correct vocabulary.

Question 5

Q5 Responses to this question on metamorphism, metamorphic textures and index minerals were variable and it proved to be a good discriminator. Most Candidates coped well with the index minerals part (b) but the reason for a lack of foliation in part (a) was not done as well.

a) (i) This question proved to be a good discriminator with a range of marks awarded. The majority of students could identify **M** and **P**, with some also identifying **N**. Rock **L** proved to be the most difficult for the Candidates to identify.

(ii) Candidates could identify **M** as the unfoliated metamorphic rock, but found it more difficult to explain the reasoning. Candidates were required to explain the lack of platy minerals or the rotation of quarts grains which prevents foliation.

(iii) Some Candidates did not take note of the word texture. Others did not name the texture but just described it. Both porphyroblastic and schistose texture were credited. Descriptions were done well for the majority and there were some good descriptions of the garnet porphyroblasts. However the better answers came from the descriptions given for a schistose texture, with Candidates discussing the alignment of platy minerals perpendicular to stress. Additionally explanations of the formation of the porphyroblastic texture continue to be confused with the igneous porphyritic texture, with statements such as the garnet grew first, or formed by slow cooling, or formed as a result of two stages of cooling.

b) (i) This question was well answered with the Candidates giving good definitions of the term grade. Some Candidates also defined the index minerals correctly. Isograds were the least well defined of the three terms. Candidates often did not establish the importance in this being a line.

(ii) This question was answered well by the majority of Candidates. There were a few Candidates who incorrectly joined up the letters, which were not credited.

(iii) The vast majority of Candidates correctly identified that the intensity of metamorphism increased from SW to NE. A few candidates used the terms left, which were not credited. Candidates should be reminded that direction questions should be answered using compass orientations.

(iv) Some Candidates struggled to name and state the temperature and pressure conditions sillimanite forms at. Many Candidates gave vague temperature terms, while others had no idea at all. Sillimanite is the high grade regional metamorphic mineral which is well known as it has been used on recent examination papers.
The majority of Candidates did correctly name the rock.

Question 6

The standard of responses to this question on the processes of magmatic differentiation were variable. There were some excellent answers which included all three processes and used the correct terminology in their descriptions. Nearly all candidates addressed all three sections of the question with good use of clear headings; and the mark scheme allowed flexibility of marks

across the sections. The question allowed the best candidates to give well-structured answers which differentiated from the weaker answers

The Candidates who did least well had limited knowledge of the specifics and key terminology needed to answer the question fully. Answers were often very general. Candidates did not make use of the guidance/prompt provided at the beginning of the question. These answers did not include the terms early settling minerals or olivine or augite in their answers, which limited their understanding.

Some candidates did not understand that magmatic differentiation causes a magma to change composition. A few Candidates did not include any of the processes that had been stated in the question. Some Candidates used diagrams to illustrate their answers. Candidates, who drew a diagram, chose to draw Bowen's Reaction Series to illustrate the sequence of minerals.

Question 7

There were some excellent answers but this was a more challenging question than some candidates realised. The question asked for the depositional environments of three glacial settings. Many addressed the characteristics in one section but ignored or answered poorly another. This made it difficult for some candidates to gain high marks. There are a large number of marking points and so there are many ways to achieve full marks, even omitting some areas from each section.

Some Candidates did not have a sound knowledge of the sands and gravels section to their detriment, as this has been a well-known part of the specification and has been post in multiple ways in previous exam papers. Candidates had a better understanding of boulder clay, but still struggled with the variation in seasonal deposition in varves. The Candidates presented a greater depth of knowledge on boulder clay than the other depositional environments, with students favouring sorting, angularity and deposition when the ice melts. There was some confusion over how striations occur - the clasts are in this case striated.

A minority of Candidates did not use diagrams to illustrate their answer. There was little evidence that any Candidates ran out of time and the omission rate for this question was low. The standard of responses to this question was variable but showed a range of scores and was a good discriminator.

F793 Practical skills in geology

General Comments:

This was the ninth year of assessment of coursework in the current format and the final year for first entry AS candidates studying the one year course. The overall standard of work was again high with many candidates producing good work. Some excellent responses were seen by moderators this year. Candidates demonstrated excellent subject knowledge and were able to express themselves clearly and concisely using a sound range of geological terminology. The new evaluative task proved popular with many centres and allowed candidates to score well demonstrating good knowledge and skills.

This year more centres were seen to be marking closely to the agreed mark schemes however common issues remained. This is usually linked to failing to spot errors in marking onto, labelling or annotating graphs, maps or diagrams. Again for a small number of centres issues remain with poor photograph and sketch labelling and measuring. To aid the marking of graphs, graphic logs, sketches etc. centres might find it useful to use acetate overlays taken from the relevant sections of task mark schemes. But of great significance is the failure by centres to take note of relevant additional guidance in the mark schemes.

The Moderating team found that in the Centre-based Tasks, CB2 and CB3 were equally popular with CB1 less so. The Centre Based Tasks remain clearly much more popular than the alternative Fieldwork Task.

Moderators are now finding few centres who do not provide clear annotation of candidates' work and indication of where marks are being awarded. This enabled the moderators to follow clearly the centre's marking and attempt to agree with them. Some centres included 2 tasks of equal mark value for either Centre-based or Evaluative tasks in their samples. It is not the moderator's role to select which might be the better of the two.

Whilst administration was completed to a high standard by most centres clerical errors remain an issue that can hold up the moderation process. This resulted in delays in the moderation of a small number of centres whilst these were sorted out. This applies particularly where a candidate's marks have been changed, to check that the right mark is clearly shown and is recognisable on the script, and that the correct total is shown. Clerical errors can also lead to an invalid order of merit which also causes delay to the moderation process.

Moderators are still finding centres introducing new additional marking points which they have chosen to accept. Centres are reminded that they need to contact OCR if they wish to query any element of the mark scheme and to check Interchange to ensure they are using the most up to date version of the relevant mark scheme as amendments may be made during the year.
In all mark schemes the additional guidance about what precisely is required in candidate answers is provided to help centres make judgements and award marks correctly. A small number of centres are still not taking note of this resulting in over marking on some question components.

Comments on the Centre Based Tasks;

It is now very rare to find a centre which has not supplied trial data with the Centre-based tasks this year. Centre comments where a student's results differ from trial data and marks are awarded greatly assist the moderator, however a small number of centres still give marks for results which clearly conflict with the trial data, but as the student results were consistent with each other's, moderators were able to accept the awarded marks on the basis of teacher's

comments. If an obvious point appears to have been missed out from the mark scheme please contact science@ocr.org.uk.

Centre-based Task 1

CB1 This task was a revised version of that used in a previous assessment cycle. It was not as popular as the other two Centre-based tasks. In part this may be due to the potential variability in the data that candidates generate in the practical itself which is typical of a Centre-based task in its first year. In a small number of centres candidates had difficulty following the written practical procedures resulting in some strange results, but in most it worked well. Centres are reminded that if a candidate is observed doing everything accurately and precisely then the results can be validated by a comment on the script if determined as acceptable when outside the trial data range. The other components of the task did not throw up any issues and were generally done well. The comments made earlier in the report apply to the photograph components on this task.

Centre-based Task 2

CB2 This task was new last year and proved popular with many centres. Sediment analysis and sieving is a straightforward practical that most candidates performed well. When referring to inaccuracies candidates need to ensure that two clearly distinct reasons are given following the mark scheme. It was noticeable in many responses that descriptions of their sand sample were often rather general and did not always identify clearly its source from a beach. Candidates are clearly getting better at identifying features in sketches and drawing and labelling them on the evidence of this task.

Centre-based Task 3

CB3 This task was appearing for the third time and was popular with a significant number of centres. The practical element proved to be fairly straightforward with few problems. The mark scheme and additional guidance clearly stated that for rock textures and formation both were required for the award of a mark. With sketches some centres are still too generous with marks for labels, measurement, annotation and description. Candidates need to provide a full range of labels for the features and a set of measurements to get full marks

Comments on the Fieldwork Tasks;

Although centres using Fieldwork tasks, which are the alternative to Centre Based tasks, were fewer they were almost without exception using the new approved tasks downloaded from Interchange. As a result centres are now submitting a range of photos, sketches and other data with fieldwork in the same way that trial data is provided for Centre Based tasks. This is greatly assisting the moderation of fieldwork with much greater clarity on how marks are being awarded. Moderators saw some very good examples of high standard work, with supporting annotation and thorough marking clearly linked to mark schemes.

The quality and clarity of marking continues to improve causing the moderators fewer problems. Using the new OCR approved tasks on Interchange there is now much greater consistency in the work being produced and marks awarded. This applies particularly to rock descriptions and graphic logs, and increasingly to annotation of sketches and measured datasets.

Graphic logs now follow the same marking principles in Fieldwork tasks as Centre-based and Evaluative tasks which include a log element. However a few centres submitted logs which were not really appropriate either due to their lack of bed variation or having too great a thickness and height to be realistically logged accurately by candidates in the field.

Rock descriptions now show more detail consistently and data sets of measurements are more substantial. Moderators saw some very good fieldwork in evidence including logs and sketches. However moderators are still seeing some instances where a few weak candidates were getting 6-8 marks for an Evaluative task and 18-19 for their Fieldwork due to generous marking.

It should be noted that fieldwork must have been OCR approved. An approved task will have a "T" number clearly labelled at the top of the information sheet. A very small number of centres still had their candidates doing work that had not been finally approved or; a few still had fieldwork that had not been submitted for any feedback at all.

Comments on the Evaluative Tasks

The Evaluative tasks were clearly and accurately marked with close adherence to the mark schemes by the vast majority of centres. EV1 had amendments made during the year which were on Interchange. It is essential that centres check on Interchange before setting any task. During moderation it was noted that not all centres had used these updates to the mark scheme. If an obvious point appears to have been missed out from a mark scheme please contact science@ocr.org.uk.

Evaluative Task 1

EV1 This new task proved a popular task that allowed candidates to demonstrate a range of skills, knowledge and understanding. Some centres applied a generous interpretation of marks to some components or did not fully use the additional guidance in the mark scheme. Some components required the use of specific terminology in responses allowing more able candidates to score higher marks. This task also had a photo component that was slightly overmarked in relation to labels and measurements.

Evaluative Task 2

EV2 This proved a popular task with many centres. Candidates scored well on the data processing and graphical element. The elements requiring calculation and interpretation also proved to be good in stretching the more able candidates. Where identification of features from photographs was required most candidates performed well, however this was not always backed up by detail in their explanations.

Evaluative Task 3

EV3 This task was appearing for the third time and proved popular with centres. This task was generally done well by most candidates. In some question components there was over generous marking where the mark scheme required either two features to be described and explained, or two pieces of detail, for the award of a mark.

F794 Environmental Geology

General Comments:

Many candidates were able to demonstrate sound knowledge and understanding of the key ideas and concepts of the Environmental Geology unit. Although there were some 'no responses' to part questions, virtually all candidates attempted the final 8 mark extended response question suggesting timing was not an issue.

Candidates with good synoptic knowledge scored highly, as did those who read the questions carefully, taking note of the command words used and ensuring their responses were concise and answered the specific questions asked. Some candidates could improve their responses by ensuring they carefully study and take note of all the information and prompts given to them in questions, including any accompanying diagrams.

Some candidates struggled to answer questions set in unfamiliar contexts and gave rote learnt answers that appeared to be answering different questions to the ones set. In some cases, there was too much reliance on model answers to questions set in previous exams. Candidates didn't always fulfil all the requirements of a question to get the marks, particularly those asking for a description and an accompanying explanation.

The quality of diagrams drawn for question 2(b)(ii) were variable and overall the standard of response to this question was poor. Drawing accurate, labelled diagrams is a key skill in Geology and candidates would be advised to practise them at every opportunity. Centres should also consider the advice they give to candidates who find handwriting difficult. For example writing technical terms in capitals where this is a requirement for Quality of Written Communication (to provide clarity in the interpretation of their spelling), or applying to make use of the provision available to candidates who are for example dyslexic.

Comments on Individual Questions:

Question No. 1

Q1 Oil and gas proved to be a well-known area of the specification. Candidates who appreciated that the questions asked were about gas rather than oil performed well, but candidates who wrote answers applicable only to oil failed to access all the marks available.

a) (i) Most candidates knew that reservoir rock is the technical term used for a rock that stores gas or oil but many lost the mark due to incorrect spelling.

(ii) The properties of a desert sandstone that allow it to store and yield economic quantities of gas were well-known and there were many good descriptions linked to appropriate explanations. Some candidates ignored the word gas and wrote about oil but as the requirements are the same for both they were still able to attain marks.

(iii) Fewer than half the candidates correctly recognised the horst structure between faults **F1** and **F2** on the cross-section diagram. Horst and graben was allowed but some spelling was questionable – most memorably "horse and garden" structure. Most candidates attained a mark for identifying that the evaporites formed a cap rock. Some candidates could improve their answer by ascertaining the source rock (in this case Carboniferous coal) and the route of migration of the gas (in this case up the faults). Although there were no marks for explanations relating to why the gas is stored in the Permian sandstone as it is not found throughout the sandstone, a mark was awarded for explaining why the gas is found at the top of the sandstone. Several candidates ignored the information on the cross-section and suggested chalk was

the reservoir rock and clays, siltstones and sandstones the cap rocks.

b) (i) Many candidates were unable to describe correctly the methods that could be used to extract gas from the production well and some did not notice that a production well was already in place. Only a few thought to describe primary recovery methods – gas coming to the surface under pressure and then being pumped out – which would have attained both marks. Most concentrated on secondary or tertiary recovery methods and lost marks as they often gave answers applicable only to oil extraction. For example, water flood drive and steam injection are not applicable to gas. Those who described gas flood drive only attained the mark if they named a correct gas used such as carbon dioxide.

(ii) Candidates were quite successful at calculating how many years the gas reserves will last at current rates of production. The most common incorrect answer of 190.7 years was because some candidates failed to consider that monthly rather than annual gas production was given. A significant number of candidates also failed to give their answer correctly to one decimal place.

c) The quality of responses to this question asking for one technological and one safety issue of transporting gas by submarine pipeline was variable. At the top end, there were some excellent descriptions that scored maximum marks with ease. Once again, some candidates penalised themselves by giving answers applicable to oil rather than gas pipeline transport. For the technological issue, some described the problem of the pipeline breaking rather than the properties the pipeline needs to prevent it from breaking. For the safety issue, some candidates lost the mark by describing an environmental issue often related to oil spills that did not answer the question. Furthermore, there were many vague references to the gas being toxic.

d) Underground gas storage facilities in rock were well-known and those who had learnt their facts scored highly. A minority of candidates lost the name mark – for depleted oil / gas reservoirs some omitted the word depleted; for salt cavern storage a few erroneously used the term salt dome.

Question No. 2

Q2 The quality of responses to this question on residual and placer ore deposits and the impacts of mining and mineral processing was variable. There were some excellent answers and these candidates displayed in-depth knowledge of ore deposit formation and extraction. However, some candidates could improve their answers by ensuring they apply their knowledge to the specific questions asked and it is a good idea to read through the whole question before starting to answer the individual parts.

a) (i) Candidates found this question on the formation of residual deposits of bauxite challenging and it was not answered particularly well. The question asked for a description of formation, so explanations about the conditions required for bauxite formation were best reserved for part (ii). There were no marks available for stating chemical weathering as this was given in the question, but candidates could have gained a mark for describing chemical weathering or naming hydrolysis as the specific type of chemical weathering. For the solution mark, not all described both parts of the marking point - a correct named substance (e.g. mineral) and the process of dissolving. For the bauxite mark, not all specified either that bauxite is insoluble / the residue or that it forms at / close to the surface. There was confusion with secondary enrichment – some candidates described precipitation below the water table or gossan at the surface. Other candidates thought the bauxite was there to start off with and became more concentrated rather than being a product of the chemical weathering. Another error was to use the term gangue for the products of chemical weathering.

(ii) The factors that control the rate of chemical weathering and the formation of residual deposits were better understood and there were many good answers to this question. Some candidates lost marks because they stated rather than explained factors, while others repeated the same explanation for each factor – it speeds up the rate of chemical weathering rather than giving an explanation specific to the named factor.

b) (i) Although most candidates were aware of the physical and chemical properties that allow minerals to be concentrated in placer deposits, only the best answers referred to the precise properties of diamond. Some stated diamond has no cleavage when in fact it has 4 perfect cleavages and many suggested that the hardness prevented the diamond from breaking into pieces. Others gave hardness and density as the two properties, both of which are physical properties. For the chemical property, many stated diamond is insoluble and does not dissolve which are two descriptions rather than a description and an explanation. In common with previous years, there was confusion between the terms weathering and erosion with many candidates using them as if they are interchangeable, thus highlighting a lack of synoptic knowledge. Weathering is *in situ* breakdown, whereas erosion is wearing away during transport.

(ii) The quality of diagrams showing how placer deposits can form on beaches were variable but overall they were mediocre. Some candidates ignored the word cross-section and drew a plan view, thus limiting their mark to a maximum of one. The accuracy of many diagrams was poor – some drew the beach at far too steep an angle, whilst others scribbled what was supposed to be the wave zone. A number of candidates failed to label the location of the placer deposit on the beach or labelled it incorrectly offshore. Other labels were often insufficiently detailed to attain the second mark. Candidates should be encouraged to practise drawing neat and accurate labelled diagrams to summarise the formation of all the ore deposit types listed on the specification.

(iii) Mining methods used to extract a placer deposit at the surface were well-known but not all candidates gave credit-worthy accompanying descriptions. Stating opencast mining is at the surface was insufficient as ‘at the surface’ was given in the question. Descriptions of how the material is mined using excavators or the removal of the overburden did attain credit.

(iv) Many candidates gave good answers to this question about the advantages and disadvantages of mining placer deposits at the surface compared to mining underground deposits. However, a few lost marks as they stated mining at the surface was cheaper, easier or safer but without an accompanying explanation. Incorrect answers suggested that no machinery is needed for surface mining. There was some confusion about the overburden – a few stated that surface mining is easier as no overburden needs to be removed which is incorrect.

c) Only a minority of candidates were successful in accessing this stretch and challenge question on how mining metallic mineral ores results in acid mine drainage water. These candidates gave excellent explanations of how sulfur dioxide and sulfuric acid are formed when metal sulfide minerals exposed to the atmosphere react with oxygen and water. There was confusion with heap leaching and many repeated the question that the water is acidic with no explanation of why it is acidic. Others did not answer the question asked as they described the environmental consequences of acid mine drainage water rather than how it forms.

d) Mineral processing operations and their environmental consequences were well-known and there were many excellent responses to this question that scored the maximum 3 marks with ease. A minority of candidates lost marks as they described the environmental consequences of named mining operations as opposed to mineral processing operations and there were a few ‘no responses’.

Question No. 3

Q3 This question on geochemical surveys proved to be a good discriminator. Although all candidates could show some relevant knowledge, only those who applied their knowledge and understanding to the particular situations given in the questions gained the highest marks available.

a) (i) The technical term anomaly which is given to a concentration of metal above its normal background value was not well-known. Many failed to appreciate the context of geochemical exploration and gave answers such as grade, ore deposit and concentration factor which are incorrect in this situation. In common with reservoir rock, a significant number of candidates who did know the correct term did not spell it correctly.

(ii) Candidates who correctly shaded the area on the map where an economic copper ore deposit is most likely to be found had considered the statement given in the question that 'values above 70 parts per million copper are significant'. Shading both directly on top of at least three of the four anomalous values or upstream of them was given credit. A significant number of candidates only shaded the 112 and 110 ppm copper values and lost the mark, while others carelessly included the 0 ppm value.

(iii) Some answers to this question asking for an explanation of why the copper values in the stream sediments decrease downstream suggested a lack of understanding. Some were confused with placer deposits and suggested that the copper had been deposited upstream because it is dense, or that the copper had been worn away by abrasion and attrition, or that it had been taken into solution. The best answers not only used the word dilution or diluted but explained the cause of the dilution being more sediment entering the river from downstream tributaries or surface run off. Descriptions of dispersion where small amounts of metals are spread out around an ore deposit were not accepted as a correct answer as they did not explain why the values decrease downstream in a river.

(iv) Candidates who gave a correct description and explanation for the variation in copper values in the sediments along the coast were in the minority. Some ignored the word coast and attempted to describe and explain the pattern within the river drainage basin, whilst others lost a mark because they ignored the command word describe. Only the best answers included a good description using correct terms such as east, west, river mouth and a sensible explanation suggesting either deposition at the river mouth due to loss of energy or currents such as longshore drift transporting sediment along the coast in one direction. The use of left and right for east and west was not given credit and there was confusion between currents, waves, winds and tides in some answers.

b) (i) The source of radon from radioactive decay of elements in granite was well-known but a minority of candidates failed to give precise explanations of how radon is produced from the breakdown of other radioactive elements.

(ii) There were many good answers to this question about why radon is considered a hazard with excellent explanations of how radiation from radon can damage DNA in cells and cause cancer. The fact that radon is a gas so can be inhaled or is dense and can build up in houses was also well-known. A number of candidates were confused with the use of radon gas in groundwater as a possible method of earthquake prediction or suggested that it is flammable. Some suggested that radon has a very long half-life when it is actually a matter of days (which is why it can be used for earthquake prediction).

(iii) Many candidates successfully assessed that the risk from radon at the surface would be higher if the superficial deposits were sand and gravel rather than clay. Most correctly cited the high permeability of sands and gravels as the reason or gave the reverse argument for impermeable clay. However, a significant number of candidates didn't give an explicit assessment of the risk so lost one mark. Others suggested

incorrectly that the permeability of sand and gravel would allow the radon to escape and would therefore reduce the risk or that clay would trap the radon and increase the risk.

Question No. 4

Q4 Water supply continues to be a well-known area of the specification with some excellent responses given to this question based on the London Basin. However, some candidates failed to apply their knowledge and understanding correctly to the particular situations given in the questions, whilst others appeared unfamiliar with topics that are examined less often.

a) (i) Most candidates could describe a correct difference that would be found in the chalk rock above and below the water table. A few penalised themselves by not describing the situation both above and below the water table. A very small number stated above and below the aquifer and were not awarded the mark.

(ii) The standard of explanations of why the water in the fountains in Trafalgar Square initially flowed naturally without the need for pumping were also good. A small number of candidates did not include the word hydrostatic in their description of the high-pressure conditions and consequently were not awarded the mark.

b) (i) Most candidates correctly plotted the line graph showing the groundwater levels in the Trafalgar Square borehole and coped well with the negative numbers.

(ii) Candidates struggled to state correctly all the decades when the water level in the borehole was more than 75 metres below sea level for some of the time. Candidates who stated 1940-1970 were not awarded the mark as they had not included the 1970s and those that quoted specific years were also penalised as they had not considered the requirement to give decades.

(iii) The problem of subsidence of the land surface was well-known but not all went on to explain the cause precisely enough to attain the second mark – in particular, specifying that water was being extracted from the pore space thus leaving the grains unsupported. A few candidates gave irrelevant answers quoting the urbanisation of London which did not take into account the link to the previous question about the drop in groundwater levels.

(iv) The idea of subsidence causing a reduction in porosity or compaction of the aquifer and thus a reduction in the water storage capacity was well-known and this question was answered well. A few suggested that the reduction in the level of the water table would increase the storage capacity, clearly not appreciating that the question was about the storage capacity of the aquifer rather than the volume of water within it.

c) (i) There were many good explanations of why clay can become saturated with water by candidates who knew clay has a high porosity despite being impermeable. Incorrect responses suggested clay is permeable or discussed the fact it is incompetent which is irrelevant.

(ii) Candidates were not always able to give a correct suggestion of a problem that rising groundwater levels could cause to the buildings or infrastructure of London. A significant number were confused with slope stability problems such as slumping rather than thinking about a problem such as flooding or instability that could affect foundations, tunnels or the infrastructure below the ground. Some incorrectly suggested liquefaction, associated with earthquakes, which is a problem for sandy soil rather than clay.

d) The advantages and disadvantages of using surface water rather than groundwater sources for drinking water supplies were well-known and the standard of responses to this question was high. Although ease of extraction was given credit, in the future these answers could be improved by explaining why it is easier to extract surface water.

Question No. 5

Q5 The overall standard of responses to this extended question on the geological materials used for building stone, bricks, cement and concrete was very good. Candidates who took careful note of the requirements of the question to describe and explain the characteristics of named geological materials that make them suitable for the uses often gave excellent answers. Some of the candidates who wrote their answers in bullet point form lost marks due to a lack of clarity and a clear sustained line of argument; they didn't always give a description and correct accompanying explanation.

Those who had learnt their facts were able to give impressive lists of suitable geological materials along with relevant descriptions and explanations of why they are suitable for each use. A few lost the name marks as they either didn't name any suitable materials or they named incorrect materials. Others merely described rather than described and explained the characteristics needed. Contradictions were not allowed and some candidates wrote lists including some correct and some incorrect named materials thus penalising themselves. In addition, contradictions between the named materials and their characteristics were not given credit.

Suitable rocks for building stone and their required characteristics were best known and many scored the 3 marks available with ease. However, a common error was to merge the two separate marking points of well-jointed so easy to extract or soft so can be sawn into blocks, with some answers stating 'well-jointed so can be sawn into blocks'. Answers relating to limestone most often contained contradictions such as it is impermeable or resistant to chemical weathering. References to kitchen worktops and other uses were irrelevant.

Geological materials used in bricks were less well-known and some candidates were unable to describe and explain the characteristics of named materials used for this purpose. Although candidates were required to give three correct, named materials for the cement and concrete mark, the majority of candidates did attain this mark. Most were also able to gain credit for a correct description and explanation of a geological material used in cement and one added to make concrete. However, there was some confusion between cement powder, mortar and concrete.

Weaker answers merely repeated that for all three uses the materials had to be strong, hard and impermeable and some lost marks as they described the properties of the finished products rather than the characteristics of the geological materials that go into them, especially in the case of bricks. There was also confusion with roadstone – particularly for building stone, cement and concrete.

F795 Evolution of Life, Earth and Climate

General Comments:

Candidates found the more familiar aspects of the paper relatively straightforward however the aspects that are less commonly tested proved more of a challenge. There was no evidence for large numbers of candidates running out of time and indeed almost all were able to attempt both of the extended response questions.

Candidates had a good understanding of general brachiopod morphology and indeed most morphology based questions in the paper such as those crinoids and ammonoids were also answered well. Candidates have a sound knowledge of fossilisation processes and factors affecting it, although a significant number of candidates appeared unaware of the detail of the basic mineralisation processes involved. There were a number of questions that covered areas of the specification that had not been assessed in detail in previous series and it was these that proved the most challenging to candidates.

Trace fossils are generally less well known and the five trace fossils discussed in the paper tested a wide range of examples. Stratigraphic range diagrams linked to group and phylum recognition often prove difficult and that was the case here with few gaining full marks. Candidates could generally recognise the microfossils and were able to define them.

Plotting graphs is usually done well as in this case however working out gradients and rates can be a challenge

The extended response questions provided an opportunity for candidates to use a wide range of answers. There were a significant number of excellent detailed responses for the northward movement of the UK and the features of Saurischians and Diplodocus in particular. The best answers provided a sustained line of argument with supporting geological evidence and sufficient detail to demonstrate their knowledge and understanding of drift and Saurischian evolution to gain full marks.

Comments on Individual Questions:

Question 1:

Q1 This question differentiated between those students who were familiar with the content of the specification and those who were only familiar with areas assessed in past papers.

a) (i) Candidates were generally good at drawing and labelling brachiopods. The external view tended to be much better than the internal view. Poor diagrams drew the wrong valve or drew a side profile which did not label the valves and proved difficult to locate the muscle scars. The labels that were known well were commissure, growth lines, pedicle foramen and umbo. Lophophore support and muscle scars were less well known.

(ii) Very few candidates were unable to state that brachiopods exhibit bilateral symmetry.

(iii) Almost every candidate was able to illustrate bilateral symmetry accurately on an appropriate diagram.

(iv) The role of the fold and sulcus was not well known with many giving a general statement about either increased strength or efficient feeding. The best answers did discuss the separation of the inhalant and exhalent currents or the increased surface area for water flow without allowing sediment to get into the valve.

Question 2:

Q2 Although this question was on topics not previously assessed in detail it performed well with most students able to demonstrate some appropriate knowledge in all parts. Disappointingly a significant number of candidates had poor knowledge of the detail of the chemical processes involved in the formation of fossils which is a core area where most students were expected to gain most of the marks in part (a).

a) (i) The vast majority of the candidates knew that anoxic/anaerobic conditions were required. Only a minority gave any of the other reasons such as the presence of sulfur reducing bacteria.

(ii) An impressive number of candidates gave either deep sea marine or swamp.

(iii) Around one third of candidates were unfamiliar with silicification (or permineralization) of porous organic material.

(iv) Although this is a classic teaching example nearly two thirds of candidates were unable to state the correct replacement of an unstable calcium carbonate mineral by a more stable one.

(v) The detail of the process of carbonisation was familiar to the majority of candidates and only where description without explanation was offered were full marks not gained. However although very few candidates gave no response around 1 in 6 provided no relevant content in their answer.

(vi) Most candidates were able to say something relevant about the factors that improve the preservation potential of an organism.

b) (i) Trace fossils has not often been tested in detail and so it was impressive how many candidates knew the purpose or cause of the five trace fossils illustrated.

(ii) Even more difficult is to link a trace fossil to a water depth and energy level yet this was also answered well either through prior learning or the use of logic.

c) The most common correct label given was either (muscular) foot or rib. Some candidates did link the ribs to drilling or grinding of the rock but there were few other correct explanations. Many candidates labelled the permanent gape or siphons which are not linked to burrowing into a hard substrate rather burrowing in general and did not gain any credit.

Question 3:

Q3 This question on biostratigraphy proved to be a good discriminator. Although all candidates could show some relevant knowledge, only those who were familiar with the specification content rather than past paper questions gained the highest marks available.

a) Being able to recognise a fossil group from its stratigraphic distribution is quite a difficult task, then to be required to give the fossil group and its phylum makes the question a real challenge. Even though very few candidates gained full marks many could recognise the distribution of graptolites and trilobites, these candidates also generally knew the correct phylum. Therefore 1 or 2 was a common mark. Many also recognised the ammonoid distribution but tended to call the group ammonites rather than the broader ammonoids. Corals were less well recognised and certainly the phylum cnidaria was not well known.

b) Around one in four candidates offered a correct morphological change in brachiopods pre and post the Permian extinction event. The most common correct answer was the change from strophic to astrophic hinge lines, less frequent answers included large to small and no foramen to possessing a foramen. Occasionally a candidate would only gain 1 of the marks because they described the brachiopod post extinction event but not before so only gained 1 mark.

c) Candidates are excellent at recognising the value of a zone fossil that has a short stratigraphic range and so most candidates gained both marks for recognising the graptolites (A) as an excellent zone fossil. Candidates could also have chosen the ammonoids.

d) The majority of candidates could interpret the time range graph and so gave the correct time distribution for the assemblage given.

e) Knowing that ceratites are the ammonoid group found in the Triassic was known by 40% of candidates. It is expected that candidates know the distribution of goniaties, ceratites and ammonites.

Question 4

Q4 This question assessed practical and mathematical skills. Some candidates found it challenging to demonstrate competence in the skills involved in drawing and analysing a graph. Skills which they should have learned in GCSE science, and which should have been straight forward to apply in a geological context.

a) (i) Most candidates had no difficulty plotting the points on the graph although some candidates were very scruffy in their marking of points. Candidates should take their time to ensure a tidy clear set of points marked on the graph. Most candidates were able to draw an appropriate best fit line between 10, 000 and 20, 000 years. A few candidates missed it out completely and some drew a straight line of best fit through the whole set of data.

(ii) About 30% of candidates were able to work out the average sedimentation rate, some difficulty was had as the units on the graph were in 10^3 years as was the expected answer. Some candidates instead of dividing their answer by 10 divided by 10,000 and so were several orders of magnitude out.

(iii) A similar number of candidates could work out the amount deposited over 11Ma which required multiplying their answer from 4aii by 110. Candidates with the incorrect answer in 4aii could still gain the mark if the method was correct (applying error carried forward to avoid double penalising a candidate).

(iv) Bioturbation is quite well known although it was sometimes confused with turbidity currents. Most candidates described the mixing of the sediment due to animal activity. Candidates had more difficulty explaining the vertical section being due to the date being homogenised by the process so all the bioturbated layer has the same age.

b) Almost all the candidates could come up with at least one valid reason why sedimentation rates vary and cannot be used to work out the age of the Earth. The most common correct answer was linked to erosion of earlier deposits, others discussed different sedimentary environments having different rates. The best answers compared two environments with contrasting rates of sedimentation such as deep sea fine mud accumulation versus rapid accumulation in flash flood events.

Question 5

Q5 This question performed well with most candidates able to provide suitable supporting detail in at least some parts of the question.

a) (i) Many candidates knew the fundamental difference between a macrofossil and a microfossil although many had difficulty putting this into words. Better answers mentioned that macrofossils can be seen with the naked eye whilst microfossils require the use of microscopes. Weaker answers mentioned the difference in size or that macrofossils can be seen with the naked eye but microfossils can't which is too vague.

b) (i) Most candidates knew what a crinoid was and were able to draw a good diagram with 3 or 4 appropriate labels. The standard of the drawing varied massively. The drawing and labelling of representatives from each fossil group should be practiced regularly. Candidates should be encouraged to apply standard practice for scientific illustrations such as stopping the end of the line from the annotation to features (such as the stem, calyx and brachia) so that it touches the feature labelled.

(ii) Although most candidates had an idea of the function of some of the morphological features very few could actually describe the features in any detail. This made gaining full marks very difficult and many candidates achieved only 1 mark. Candidates need to be able to describe the morphological features of the main fossil groups and know their function.

(iii) The majority of candidates knew that a crinoid is held together by soft tissue that on death may decay leading to its disarticulation. Better answers mentioned the soft connective tissue running through the centre of the ossicles in the stem (and brachia) which decay leading to disarticulation.

(iv) Many candidates linked an environment with a current to the disarticulation of the crinoid. Less common was a link with aligned stems or brachia with the current. Weaker answers discussed alignment of ossicles which would not be obvious as they are usually circular. The very best answers also mentioned the sorting of the fragments.

c) (i) About half the candidates knew that pollen and spores were microfossils associated with plants. Weaker answers gave one of these but then gave an incorrect microfossil such as foraminifera.

(ii) Candidates had difficulty linking plant microfossils to their use in establishing the stratigraphic record. Strong answers knew that they indicated terrestrial conditions or discussed them being transported by wind into neighbouring marine environments. Some candidates knew what makes a good zone fossil so discussed their widespread distribution and abundance.

d) (i) Candidates generally showed a good knowledge of the three microfossils shown being able to identify the ostracod, conodont and radiolarian. They were less certain about the composition of the microfossils. About 20% of candidates gained full marks.

(ii) Candidates were not sure about the palaeoenvironmental conditions indicated by ostracods. Good answers mentioned that salinity is a large controlling factor on the type of ostracod present. Fewer knew that ostracods are benthonic and so indicate benthonic conditions.

(iii) Teeth or jaws were given almost universally by the candidates, some linked it to the jaws of the Hag fish.

Question 6

Q6 This question worked well at assessing the ability of candidates to apply familiar knowledge and understanding in less familiar contexts. For most candidates the stretch and challenge provided allowed them to use a wider range of responses that more conventional questions may have allowed, reflecting the breadth of learning opportunities being used in many centres. It is clear that some candidates have really engaged with this topic and made use of appropriate technical vocabulary beyond the specification content. However some candidates found this question very challenging and were clearly perplexed by the absence of opportunity to use simple recall.

a) (i) An impressive number of candidates recognised the nautiloid/gontiate and ammonoid/ammonite. An occasional candidate had them the wrong way round.

(ii) Many candidates were able to label at 4 correct morphological features. Most commonly the protoconch, siphuncle, septa, septal neck, chambers and venter. Errors occurred where the aperture label was within the body chamber rather than at the opening, other errors were labelling the umbilicus and suture lines.

(iii) Candidates were excellent at describing the internal differences between the two fossils, the best answers used technical terms such as retrosiphonate and prosiphonate whilst weaker answers said septal necks point forwards or backwards.

(iv) The external differences were less well known but good answers discussed the lack of ornamentation in nautiloids and ornamentation in ammonites. Many also mentioned that nautiloids have an involute coiling whilst ammonites are evolute.

b) (i) Many candidates know how cephalopods move both vertically and horizontally so were able to discuss the role of the siphuncle, septal necks, septa and chambers in controlling buoyancy.

(ii) Working out whether a feature has a positive, negative or no impact on horizontal movement was a demanding question that required candidates to apply their existing knowledge and understanding. While some candidates were perplexed by the style of the question it was impressive to see that over two thirds of candidates could apply their understanding in a new context and gained both marks.

(iii) This question and part (iv) required candidates to apply their knowledge and understanding rather than recall previous knowledge. This was a challenge for most candidates who had no idea how to approach the question (indeed orthocones floated vertically) and so were left with guesses. The better answers linked to the lack of manoeuvrability or stability of such a straight cone shape for a free swimming animal.

(iv) The most likely change that candidates came up with was the coiling of the shell which gained a mark. The explanation of why this helped was more difficult linking to the change in the centre of gravity and so more control over manoeuvrability. Other responses offered were less likely but included the addition of cameral calcite deposits to counterbalance the heavy tentacles and head.

c) (i) Half of the candidates knew that the uncoiled ammonite shown was a heteromorphy. Candidates do need to be careful with their spelling as some heteromorphy spelling were unclear and so did not gain the mark.

(ii) Approximately 20% of candidates knew that heteromorphs like the one shown lived on or very close to the seabed (benthic) and used their tentacles to walk/move themselves along the seabed.

Question 7:

There was a fairly even spread of marks from 0 to 10 for this extended response question on the northward drift of the British Isles. As a minimum most candidates knew that desert sandstone,

limestone and coal provide evidence for Britain being in different climatic zones even if not all knew when this was or what latitude it related to.

Regarding fossil evidence most candidates concentrated on corals with many giving great detail of the conditions required for their growth.

The best answers contained a sustained line of argument and were arranged in a logical chronological order often with an accompanying drawing of the Earth showing the northward movement of Britain. These candidates were able to provide specific supporting evidence such as Britain's latitude during each period. Such candidates often gained full marks and indeed many performed at a level beyond the marks available to them in the A level mark scheme.

Question 8:

There was a normal distribution of marks (the average mark was 5) for this extended response question on saurischian dinosaurs and Diplodocus in particular. Four marks were available for a discussion of the characteristics of saurischian dinosaurs; the majority knew that they had "lizard hips" and that the pubis pointed forward. A significant number of candidates also knew that they had three digits and fewer still that these were able to grasp.

Regarding Diplodocus most candidates discussed its long neck linked to grazing in high vegetation, most knew about the peg like teeth although some said these were only for stripping vegetation whilst others incorrectly mentioned they were for chewing. Almost every candidate discussed "gastroliths" The role of the long tail was also frequently discussed in terms of being a counterbalance to the long neck or for defence. The points that were less commonly discussed were possible reasons for its large size, its sturdy legs and feet as well as the extra support bones in the tail and neck. Many offered diagrams of diplodocus that varied in accuracy but did often have appropriate labels.

F796 Practical skills in Geology 2

General Comments:

This was the eighth year of assessment using the current format, there were many very good tasks by candidates demonstrating excellent subject knowledge. Many candidates were able to use a wide range of geological terminology appropriately. There was no evidence of candidates struggling to complete the centre based and evaluative tasks within the suggested time of an hour. The most popular Centre Based Task was CB2 followed by CB3 possibly because the practical part of the task was easier to set up than the chemicals needed for the Limestone's practical in CB1, although each year the rolled over tasks are always more popular than the new task. . For the Evaluative Tasks there was a fairly even spread across the three tasks with no one task proving to be more popular.

As in the previous exam series many centres submitted their marks via interchange often well before the deadline and as a result had very prompt replies requesting their sample of work. The whole system seemed to work very efficiently this year with most centres sample requests for candidate's work being received in only a few days at most. The moderating team had received the vast majority of their centres work by the start of the half term break. Many moderators had received work several days before the 15 May deadline, which was very helpful for our standardisation meeting.

We still had a small number of centres who did not send on a copy of their IMS1; this should be printed off Interchange by your Exams Officer when the marks are submitted. A few Centres reported issues printing off this document; in these cases Centre generated copies were sent which was very helpful (in a few cases copies of the old interactive form formerly on Interchange was used). One of the most important uses of the IMS1 is to allow the moderator to quickly check candidate's marks in case there is an arithmetic error with a centre. This can significantly speed up the moderation process. Consequently if a centre has issues generating this form another format will still be useful.

IMS1 forms are especially important when several centres teach Geology as a consortia; it would be useful if the Geology teacher could contact exams offices in their consortia schools, to remind them to print off this document as these were often the most frequent cases of misplaced paperwork. Some exams officers were confused about submitting a Geology IMS1 form, and in a few instances the exams officer was not aware that their centre was entering candidates for Geology A level.

As with previous years it is worth centres noting that if your cohort of students is small (up to 15 candidates) it may be worth packaging up the whole sample to send off before the May 15 deadline. This can save you lot of time when the request does arrive as the coursework of most of candidates will need to be sent in the sample to the moderator when the cohort is small.

This year a significantly larger number of centres appeared to be offering a single task to all candidates, usually quite late in the year. This was nearly always EV1 or EV2 with CB2 offered. Centres are reminded that candidates may attempt up to three Tasks of each type (Centre-based and Evaluative) and any number of approved Fieldwork tasks and that their highest mark for each type then being the one submitted.

Where centres made use of Fieldwork tasks it was clear that hands on experience in field conditions allowed a higher proportion of candidates to access the marks available. It is concerning that many centres do not appear to be carrying out fieldwork despite the evidence suggesting that the direct intense experience of geology in the field helps students to embed their knowledge which results in better grades in both written exams and coursework. It is an

excellent experience for candidates who may be continuing their geology at HE. Next year in the new specification four days of fieldwork will become mandatory requirements for A level Geology courses and all centres should already be planning their fieldwork and that the last cohort of A level students on the current specification will get an opportunity to participate in some fieldwork before June 2018.

OCR currently has over 40 approved fieldwork tasks available for sites all across the country for AS and A2 Geology. New tasks and fieldwork sites are always welcome and centres are reminded that they should submit their details at least 6 weeks before the planned fieldwork departure date. These once up on Interchange will help any teachers who wish to develop their own tasks, as the common framework will be there for guidance, alternatively contacting OCR should allow centres to be emailed copies of these approved tasks. It should be noted that fieldwork must have been OCR approved. An approved task will have a "T" number clearly labelled at the top of the information sheet. A very small number of centres still had their candidates doing work that had not been finally approved or was still awaiting changes; a few still had fieldwork that had not been submitted for any feedback at all.

Administration;

There were only a few administration errors evident this year; the main issue arising was with the recording of marks on the actual papers and addition of candidate totals; here some Centres were using ticks which did not always accurately translate to the total marks available for a question. This caused discrepancies between the marks achieved by the candidate on the paper and that recorded as their candidate mark. In most cases the problem arose when the centre had failed to write the number of marks awarded into the right hand column provided on the paper. to the main cause of these errors was that ticks rather than marks were being counted.

Although centres are no longer required to use cover sheets by OCR, it was noticeable that fewer administrative errors occurred in those centres that continued to use cover sheets. Using cover sheets provides an additional check and helps the teacher to identify when marks have not been clearly recorded and any addition errors that may occur when totalling of marks on the papers and then recording them onto the IMS1. Centre can generate their own summary sheets for use to summarise which task are being submitted and what the total marks are for each section.

A second common error arose in the labelling and collating of candidates work; all moderators reported cases of finding candidates work without the name and/or candidate number being quoted, in a few cases wrong candidate numbers were given. As some tasks are completed quite early in the year it is understandable why candidates at that time may not be aware of their candidate number, so a request is made for all scripts called as part of the standardisation sample to be carefully checked with numbers/names added as necessary.

It is encouraging to see evidence of internal moderation being carried out and that many centres now have more than one teacher of geology. In a few cases there was difficulty in ascertaining the correct final mark when candidate's marks had been changed due to internal moderation. In a few cases where internal moderation had been carried out, marks had been changed on the script but totals had not been amended or it was difficult to tell what the correct mark should be. This was further compounded if the marks had not been recorded in the right hand column of the paper. An excellent practice used in some centres is to use different coloured pen for the initial marking of scripts and for the internal moderation; in this way there is no confusion as the right mark after internal moderation is clearly shown, is *recognisable* by the colour of ink on the script and therefore the correct total is recorded for each candidate.

Some centres are still sending more than just the two assessed tasks to the moderator; this often occurs when the candidate has achieved the same mark on two or more tasks. It is the

task of the moderator to ensure that the centre has applied the published mark scheme consistently and correctly for all candidates in the sample, it is the teacher's responsibility to select the two coursework tasks submitted for each candidate. The moderation process ensures that a national standard is maintained, and it is the teacher's responsibility to select the work for moderation that represents the performance of each candidate. Even when a candidate achieves the same mark on more than one task it is up to their teacher to decide which of these tasks to submit.

Marking;

In general marking was of a good standard and it is encouraging to see that most centres are applying the mark schemes accurately and consistently. Most centres appear to have read and have applied the additional guidance column about specific requirements for marks to be given. However there are a number of centres that did not follow the additional guidance column in the mark scheme. It is important that all centres apply the mark scheme consistently to ensure a national standard; when centres create their own guidance this invariably results in mark adjustment which affects all candidates from a centre. The best outcome of moderation for all candidates in a centre is that the centre's marking is found to be consistent with the national standard and that no mark adjustment needs to be applied to the marks from that centre. It is worth reiterating the advice given last year on this issue:

- In some questions two labels may be required, so if a candidate has only produced one label the marks cannot be awarded. Likewise if a list of acceptable marking points is provided in the mark scheme then these are the answers, which must be credited. A small but significant number of centres were giving credit to answers, which were not on the mark scheme, and in some cases points which were incorrect had been credited. This is not acceptable for individual centres to create their own additional marking points, as all other centres will not be crediting their candidates who may have made the same comment. If a centre feels strongly about a correct answer having been left off the mark scheme they should contact OCR by email to OCR.GCEScienceTasks@ocr.org.uk, a clarification will be provided within a few days.

- Mark schemes may have ammendments made to them as a result of these clarifications up to 31 March each year. Any changes to mark schemes will then be notified on Interchange. This way all centres and candidates benefit. Centres should make sure that they print off the most up to date version of Tasks and mark schemes from Interchange and that they sign up for Interchange updates by email at OCR.GCEScienceTasks@ocr.org.uk. .

- If a mark scheme lists some acceptable mark points and then "**AND**" is written it means the candidates MUST have points from before and after the "**AND**". This appears to be an on-going point of confusion for some Centres.

- When a term is underlined in a mark scheme then it must be used in the candidates answer, if the underlined term is not used then the mark cannot be awarded.

- It is important for centres to be using the most up to date coursework tasks. Whilst many centres will check on interchange for tasks, it is advisable to only print off papers, instructions and student sheets as close to the time you will be using the task as possible. In this way if there have been any amendments to the task all centres will be aware of them.

- If the tasks are printed and then photocopied please do check any scales within the task AND mark scheme; photocopying can change the scale and so if the Centre marks as per the mark scheme they may find all of their candidates fail to get marks dependent

upon the scale. A good way to avoid this occurring is for the teacher to trial this part of the task and to write onto a copy of the task the results they get using the scale from photocopying. Doing this will show the moderator the impact the copying has had and the teachers trial will illustrate the range of marks the candidates should then be expected to achieve and the moderator will note this in their moderation. A number of centres were aware of this issue and passed on their measurements. This was very useful and helped to uphold marks. If the task requires maps, graphs and cross sections to be marked to a degree of accuracy then teachers might find it helpful to create an accurate overlay to speed up the checking of that particular question. This can then be used for following years when the task is again available.

Preparation of candidates;

Centres should ensure that all candidates have a sound grasp of the meaning of words used in the stem of questions such as describe and explain. Although this seems obvious many candidates treat them as synonyms; a candidate might only describe and if the question required description and explanation then they would lose valuable marks. Candidates should be guided to carefully read all parts of the questions including the stem which often gives help towards what they will be expected to do.

Questions will often ask candidates to describe/explain what can be seen “in this photograph / graph / fossil. In this case the candidates must address the image they have been asked about and rather than write about generalised photographs and text book examples. Likewise with sketches candidates should draw what they see not what they have learnt in class from the text, this especially applies to student’s drawings of fossil photos when often a completely different idealised fossil is sketched. Photographs are chosen very carefully with specific features in mind, to assess the candidate’s ability to identify geological features in realistic. By drawing a generic textbook version candidates are unable to demonstrate their knowledge and understanding and deprive themselves of marks.

Centres are reminded that although the teacher will have access to the tasks the only information candidates can be shown/told/given about the task is the information provided in the ‘grey box’ in the Instruction to Teachers and Technicians document. Ideally candidates should be given this information a short time before the task in order to aid their preparation.

Centres can teach topics as outlined in the ‘gey box’ text but candidates should never be coached with targeted content specific to the coursework task. For Centre-based tasks all practical work needs to be carried out individually and it is not acceptable for candidates to work in pairs.

Comments on the Centre Based Tasks;

Centre Based tasks must always be accompanied by the trial results obtained by the teacher in their trial run of the practical; this year there was an excellent record of Centres providing this information. The teacher trial data should reflect the likely range of results which should be expected. It is possible to provide data from more than one trial run if the Centre feels that their candidates are getting data which differs from the teacher’s data. In experiments where the samples are destroyed, such as CB3, the data should show similar starting amounts so that the rates/trends of break up can be compared. This helps with applying the tolerances quoted within the mark schemes. If a tolerance is stated it must be applied.

When an experiment is involved; temperature may have an impact; it is worth the teacher carrying out their trial in the same room/similar conditions to where their candidates carry out the task, e.g. for CB2 the temperature can have a dramatic effect on the sinking rate. On no account

should candidates work together or carry out the experiment together. Each candidate needs all the equipment as outlined in the Instructions to Teachers and Technicians.

In general these tasks were accurately marked by centres. Most centres included a commentary with their moderation sample which commented upon any issues during the practical which may have caused a candidate to have answers which deviated from the teacher's trial data. This greatly aided the moderation process and allowed moderators to see why marks had been awarded by the Centre.

Comments on Individual Tasks:

Centre-based Task 1

CB1 This task has been used before and had been revised for this year. The practical component does require a little more preparation than other tasks and tasks are often less popular with centres in their first year.

1a) (i) (ii) Most candidates did not seem to find any difficulties with the practical part of this task and that they had carefully read the guidance and followed the explanations of the maths to be used.

1b) In general there were few issues with this question

1c) Most candidates provided sensible suggestion about the dangers of acid and the need to protect eyes and glassware issues.

1d) In general there were few issues with this question

2a) Most candidates wrote in a lot of detail for this question and some very detailed responses were seen with excellent use of terminology. However only the answers as listed on the mark scheme could be credited.

2b) (i) Some good quality sketches were observed and a lot of appropriate labelling was seen. The only issue with this question was that the mark scheme required four whorls to be drawn for the drawing mark to be awarded for accuracy of sketching.

(ii) Candidates provided good answers for this question

2c) There were some really good detailed responses seen showing that many candidates had a sound understanding of fossil descriptions. In a few Centres candidates gave answers with wording very similar to that in mark scheme; Centres are reminded that candidates must not be overly coached for the tasks.

2d) Some good detail was provided but this question was tricky and demanded quite a lot from candidates; they had to provide two similarities and two differences; only the points outlined on the mark scheme could be credited. All points identified had then to be labelled onto the images provided. In several cases no labelling was seen yet marks were awarded

Centre-based Task 2

CB2 This task was being used for the second year and it was the most popular with centres. Many centres had noted in 2016 that the water did not easily fall through the oil and sat on the surface, so that the surface tension had to be broken in order to let it fall. This has been highlighted in the instructions for teachers. In this task the room temperature can play an important role in the results obtained. The Centre is advised to trial the experiment in advance but if the candidates are observed during the practical to be obtaining different rates of fall to the trial data then the teacher should endeavour to take a further sample of trial data in as similar condition as possible.

1a) Good results were generally evident usually within the expected tolerance. It was also clear that centres were checking the maths used by candidates.

1b) It is not possible to credit dropping from different heights, as this is *not* on the mark scheme. Also for most candidates the water lands on the oil surface and the surface tension needs to be broken by gently pushing the droplet. Consequently drop height is irrelevant.

1c) In general there were few issues with this question

1d) In general there were few issues with this question

1e) Generic laboratory rules such as the wearing of Lab coats and tying back loose hair cannot be credited. Safety precautions must relate to specific hazards associated with the practical activity.

2a) (i) Good graphs were drawn
(ii) Most candidates gave good reasoned responses
(iii) It was possible to work this answer out in different ways, which did give slightly different results. E.g. some candidates included leap years in their calculations. Moderators were aware of this and checked answers awarding the mark if the correct result was gained from either 365 or 365.25 days.

2b) Care was needed with responses here to make sure the same marking point was not credited twice.

3a) (i) This question was answered well for what was a more difficult question. Many candidates made reference to the direction of dip of the beds or the land being tilted to the east.
(ii) A significant number of candidates gave the correct answer. Whilst the mark scheme gave the answer to 3dp it was also possible for candidates to give the answer as 4×10^{-3}
(iii) Many candidates were able to explain the effect the removal of pollutant would have on the area but struggled to give a geological reason.

4a) (i) Candidates did need to have 2 correct measurements for one mark, any measurement was acceptable but many failed to produce two. There was also a requirement for two labels as outlined in the mark scheme.
(ii) This photograph did not always copy clearly; for next year it is worth doing a quality control check on the clarity of this image before candidates undertake the task. If at all possible it is worth projecting the image as well as this allows the calcite crystals between the ooliths to be seen more clearly. A significant number of Centres credited answers that were not included in the published mark scheme with no reference to ooliths or nucleus or concentric layers. These marks could not be upheld.

Centre-based Task 3

CB3 This task is now in its third year; it was the more popular than CB1 as centres clearly felt confident with the practical component. The shells were easily available and most of the equipment was cheap and easy to get hold of.

1a) Centres are asked to make sure that they check the percentage calculations; in a few cases these answers were wrong and so the marks could not be allowed (n.b. one error was allowed).

1b) (i) This was a straightforward question.
(ii) Most candidates had no difficulties with this question. However some centres credited answers, which were the opposite of what the result showed.

1c) There was an overall improvement with this question on the previous year. Yet a small number of centres still have issues in marking safety and some centres still credited answers not on the mark scheme. The Additional guidance column states that lab coats and tying back hair are not allowed.

1d) Some good answers linked to energy were provided showing that the candidates had understood the principles behind the experiment.

2a) (i) Produced many good quality sketches. Very few candidates drew textbook versions of the fossil. Centres must take care with assigning marks; two labels on each diagram were needed for 2 marks and 2 labelled measurements for the third mark.
(ii) Candidates provided good answers for this question.

3a) This question produced some really excellent responses and many candidates gained full marks on this section. It is encouraging to see candidates being able to get into a lot of detail and exhibit their knowledge. The mark scheme provided a wide range of marking options. As with last year there were a very small number of centres where candidates answers appeared to be *exactly* the same as many of the points in the mark scheme. Centres are reminded that papers and mark schemes are confidential until the time the candidates sit the paper and that no communication re answers is allowed.

4a) Some good cross sections were seen. However a significant number of candidates had plotted the lines outside of the tolerance stated on the mark scheme and so Centres are reminded to use a protractor when marking the candidates work to check angles.

4b) Geological histories were generally well done but the expectations of the mark scheme do need to be addressed; so reference to two faults / or faults was needed, titling needed a value of tilt to be suggested.

Comments on the Field work Tasks

The quality of the Fieldwork submitted by centres was really good and it was of interest that their experience of geology in the field had clearly helped candidates at all levels to express geological ideas more clearly than was often the case in Centre-based tasks. This is very encouraging for future submissions and for the implementation of the new specification. Candidates enjoy fieldwork and it shows in the work being submitted.

All centres if considering fieldwork for 2018 submission must download new versions of the tasks, even tasks they have originally submitted prior to 2013. Centres can contact OCR direct for task information. All published tasks have been revised to make sure that the full balance of demand comparable to the Centre-based tasks is achieved. It should be noted that fieldwork must have been OCR approved. An approved task will have a “T” number clearly labelled at the top of the information sheet.

For Graphic logs the same standard is expected in both Fieldwork and Centre-based tasks to achieve a maximum of 4 marks. One mark being awarded respectively to: grain size; bed thickness; appropriate symbols for features and rock type; identification of a range of geological

features. One error in plotting is allowed. This ensures comparability between the three different types of task.

Centres are still being asked to send written information of the rock types candidates will be describing as well as photographic evidence and copies of base maps etc. These act in a similar way to the teacher trial data in centre based tasks and will create a benchmark for comparison. This is important as the moderator will not be familiar with the location used and field sites can change radically particularly coastal sites.

Field sketches for large areas in general were much improved this year and some excellent ones were seen with plenty of detailed labelling and good scales indicated.

It is perfectly acceptable to go over the general geology of an area to put the field site into context. The type of information given prior to the task should be consistent with the "grey box" information, which is published on interchange for the Centre based tasks. Candidates must work independently for this; fieldwork cannot be a teacher led activity. The only time candidates could work together is if for example two ends of a measuring tape need securing. A few locations do have information boards on the geology of the area such as Lulworth Cove. Candidates should not be shown these boards as this will give them an unfair advantage. This point was made in previous years and is still an issue for a very small number of instances. The fieldwork task is meant to test independent field geological skills in the same way as Centre-based tasks test laboratory geological skills. It is unlikely that every candidate in a centre at the same point in their fieldwork will identify a feature with very specific technical language and any suggestion of a conducted en masse tour to show off the features present must be avoided.

Comments on the Evaluative Tasks

The new EV1 task, the rolled over EV2 and the outgoing EV3 were equally popular with centres.

It is a good idea to re iterate to candidates the importance of carefully reading the questions especially information in any stem as it was noticed that the marking of EV tasks tended to be more frequently out of tolerance when compared to centre based tasks, which was also the case last year.

There were some cases with EV tasks where incorrect responses or responses not on the mark scheme were credited. It is worth re iterating that if the Centre has issues with the mark schemes then OCR.GCEScienceTasks@ocr.org.uk should be contacted as soon as the centre undertakes the tasks so that issues can be resolved. It is not possible for a centre to add additional marking points as many other centres will have candidates who will not be credited for giving the same response. In order to maintain one national standard which is fair to all candidates it is important that all plausible answers are considered by OCR and if a centre's query is deemed valid then all centres will be notified about these changes on Interchange.

Comments on Individual Tasks:

Evaluative Task 1

EV1		All sections of this task were new although some questions have had similar versions used in past exam questions.
1a)	(i)	Most candidates had good responses to this question, although a few answers were credited which did not refer to the height or steepness of cutting 2.
	(ii)	Most candidates made reference to expense as part of their answer.
2a)		Many good responses were made for this question with many candidates providing very detailed responses referring to all 4 rocks.

2b) (i) Most candidates did not have any problems with this question.

(ii) In general there were few issues with this question

3a) Some good answers explaining about arch dams were provided.

3b) (i) Candidates did struggle more with this question; many failing to make reference to high porosity as outlined in the additional guidance column.
(ii) Most candidates provided good responses about the joints and weak cement.
(iii) Most candidates were able to identify the stabilisation techniques shown in the photo. However to gain the mark it was necessary to refer to the role of rock bolts.

4a) For full marks this question required use of values taken from the information provided; many candidates did do this but many still failed to provide reasons for the high flow rates. The question required the high flow rate in the chalk and sandstone to be linked to their porosity and/or permeability.

4b) This question was well answered by the majority of candidates.

Evaluative Task 2

EV2 This task was being used for the second year.

1a) (i) The standard of graphs drawn by most candidates was good.
(ii) Criteria for the candidate response to be credited were clearly outlined on the mark scheme; some centres credited other answers and the award of these marks could not be supported.
(iii) This question required candidates to calculate the mean of grouped data in six classes. The demand of this question is foundation level GCSE Mathematics, despite this only half of the candidates gained the mark.

1b) This question needed a clear reference to size as part of the answers as shown by the 4 bullet points; answers making no reference to larger or smaller fossils should not be credited.

1c) Several centres had marking issues with this question. Some credited candidates who had written about low energy and then credited others who wrote about high energy. It is not possible to credit two completely opposite and contradictory responses. In a number of centres the answers offered by candidates on the precipitation of iron oxides in marine conditions were very similar in their wording.

2a) (i) Most candidates did not have any problems with this question.

(ii) In general there were few issues with this question

2b) (i) This question was done to a high standard.

(ii) Almost every candidate had clear understanding on zone fossils.

(iii) Most candidates were able to identify correctly the biostratigraphic zones.

3a) (i) Many candidates had issues with providing the detail required on the formation of cruziana. The additional guidance column helps here to explain how this question should be marked; it requires an answer that outlines how cruziana is made by

trilobites, not just a reference to walking.

(ii) A reference to shallow sea was needed here.

3b) This question was answered well by the majority of candidates who recognised skolithos as dwelling structures.

3c) Most candidates provided good responses about the formation of dinosaur tracks and some candidates made reference to undercasts and how the weight of the animal could be inferred from track depth. Many candidates made good use of appropriately labelled diagrams.

3d) (i) Many centres did not apply the tolerance and marked any answer correct whilst others stuck rigidly to the mark scheme. Centres are reminded that they should check their scales. During external moderation it was found that at a number of centres the scale of the Image had been distorted during photocopying and this resulted in candidates not being credited for an accurate measurement for the scale on the photocopied task (centres need to take care and use annotation to highlight where reproduction has distorted the correct answer).

(ii) Most candidates successfully calculated the stride leg length ratio and offered plausible improvements.

(iii) Most candidates gained full marks and it is clear from the quality of the answers that candidates found this topic very engaging.

Evaluative Task 3

EV3 Some really good quality tasks were submitted where candidates had clearly taken on board the advice from the grey box and had learnt this section of the course to a high standard. The main issues were caused by centres where the teacher had not applied the detail from the mark scheme to their marking..

1a) (i) This question required a reference to depth of the overburden being measured from the graph**.**

(ii) The underlined terms from the additional guidance column have to be used in a candidate's response for the mark to be awarded.

(iii) The mark scheme had clear tolerances stated for the angles of throw of the faults. These tolerances do need to be adhered to. If the scale has changed due to photocopying then the teacher can send in the values they had worked out and apply tolerances as per the mark scheme. However if a centre is stating that their scale is different to the one in the mark scheme all of their candidates should be marked with this adjusted scale; candidates writing what is in the mark scheme should not be credited in this case unless their value falls within the tolerance as worked out by the teacher.

(iv) Terms in the mark scheme that are underlined mean that the term MUST be in the candidates answer in order for the mark to be awarded.

1b) (i) Most candidates were able to complete the cross-section using the borehole data

(ii) An <u>explanation</u> for the thinning of the coal was required; such as a reference to a washout or the coal being removed. A number of centres had credited candidates who stated that the coal seam thinned; this is a <u>description</u> which is obvious from the cross-section, however the mark scheme requires an explanation to gain the mark.

(iii) The mark scheme gives clear tolerances and these tolerances do need to be adhered to. If the scale has changed due to photocopying then the teacher can send in the values they had worked out and apply tolerances as per the mark scheme. However if a centre is stating that their scale is different to the one in the mark

scheme all of their candidates should be marked with this adjusted scale; candidates writing what is in the mark scheme should not be credited in this case unless their value falls within the tolerance as worked out by the teacher.

1c) (i) Most candidates were able to access this question successfully.

(ii) Almost all candidates were able to plot the data correctly on the map using the grid coordinate system.

(iii) This was a choropleth map although some candidates interpreted the question as requiring contouring to produce an isoline map. This issue was experienced by several centres although dealt with the issue appropriately and the question was usually very accurately marked.

(iv) Terms in the mark scheme that are underlined mean that the term MUST be in the candidates answer in order for the mark to be awarded.

2a) (i) Candidates were clearly familiar with the calculation of geothermal gradient and this question was answered correctly by most candidates.

(ii) This question was done to a high standard.

2b) Almost every candidate had clear understanding on environmental control systems used in underground coal mines. Most candidates could name ventilation or mechanical cooling, and the best responses also discussed some of the problems that can arise with ventilation in coal mines.

3a) (i) This question did cause a few marking discrepancies, the additional guidance column can help with marking here. For full marks reference to three tectonic settings was required.

(ii) The stem of the question was quite clear in what it required candidates to do: compare the USA and Iceland making use of data from the table. However many incorrect candidate responses were credited by centres; for example writing about the different sizes of the two countries with no reference to the data table. The mark scheme was very specific in its guidance as to what were acceptable responses; textbook knowledge cannot be credited in a data analysis/evaluation question unless it is being used to serve the analysis of data (e.g. the 575 MW of geothermal generation capacity in Iceland represents 30% of electricity production and this is concentrated in a small number of large capacity dual power plants which meet nearly all domestic electricity requirements – the other 70% of electricity production comes from hydroelectric plants and is used for aluminium smelting. In contrast the 3086MW produced in the USA is dispersed among a large number of small geothermal plants and most of the production is for space heating and hot water rather than electricity, hence only 0.3% of generation capacity which is small even for a large industrial nation).

3b) Many centres had candidates who provide very detailed and accurate answers. The six terms shown in the diagram had to be used by the candidate in their answer to be awarded the mark.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553